भारतीय मानक
Indian Standard

IS 3406 (Part 2) : 2014

(Reaffirmed 2019)

काउंटरसिंक एवं काउंटरबोर के आयाम

भाग 2 काउंटरबोर

(तीसरा पुनरीक्षण)

Dimensions for Countersinks and Counterbores

Part 2 Counterbores

(Third Revision)

ICS 25.100.30

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली–110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

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Engineering Standards Sectional Committee, PGD 20

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Engineering Standards Sectional Committee had been approved by the Production and General Engineering Division Council.

The standard was originally published in 1966 to cover the dimensions of countersinks for screws M1.6 to M20 and counter bores for cheese head screws and socket head screws M1.6 to M26 according to IS 1365 : 1962 ‘Specification for slotted countersunk head screws (1.6 to 20 mm)’, IS 1366 : 1962 ‘Specification for slotted cheese head screws (1.6 to 20 mm)’ and IS 2269 : 1963 ‘Specification for hexagon socket head screw’.

It was first revised in 1975 and published in two parts. Part 2 covered the dimensions of two types of counterbores. Type A for screws in accordance with IS 1366 : 1962 ‘Specification for slotted cheese head screws (1.6 to 20 mm)’ and Type B for screws in accordance with IS 2269 : 1967 ‘Specification for hexagon socket head screw (*first revision*)’.

The second revision in 1986 was based on DIN 74 (Part 2) : 1980 ‘Counterbores for hexagon socket head cap screws and slotted cheese head screws’. In this revision Type A and Type B counterbores were redesignated as Type H and K.

In preparation of this revision, considerable assistance has been derived from DIN 974 (Part 1) : 2008 ‘Diameters of counterbores — Manufacturing dimensions — Part 1 : Hexagon socket head cap screws and screws with cheese head or pan head’. The present revision covers five series of counterbores in line with DIN 974 (Part 1) : 2008. Series 3 for screws with spring washer has been covered as per DIN 974 (Part 1) : 1991 since Spring washers based on IS 6735 and DIN 7980 are used in India. Series 6 for spring washers is not covered since Indian Standard for disc spring is not available.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off values should be the same as that of the specified value in this standard.

Indian Standard

DIMENSIONS FOR COUNTERSINKS AND COUNTERBORES

PART 2 COUNTERBORES

(Third Revision)

1 SCOPE

This standard specifies the counterbore diameters for constructional components for Screws with Cylindrical head with or without Washers.

2 REFERENCE

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

IS No.	*Title*
1366 : 2002/ISO 1207 : 1992	Slotted cheese head screws — Product grade A (*third revision*)
1821 : 1987/ ISO 273 : 1979	Dimensions for clearance holes for bolts and screws (*third revision*)
2102 (Part 1) : 1993/ISO 2768-1 : 1989	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*)
2102 (Part 2) : 1993/ISO 2768-2 : 1989	General tolerances — Part 2 Geometrical tolerances for features without individual tolerance indications (*third revision*)
2269 : 2006/ISO 4762 : 2004	Hexagon socket head cap screws (*fifth revision*)
6101 : 2005/ISO 1580 : 1994	Slotted pan head screws — Product grade A (*second revision*)
6735 : 1994	Fasteners — Spring lock washers for screws with cylindrical head — Specification (*first revision*)
7483 : 2005/ISO 7045 : 1994	Pan head screws with type H or Z cross recess — Product grade A (*second revision*)

3 COUNTERBORE DIAMETERS

Depending upon the type of the Screws and the type of the Washers used, the Counterbore diameters are of five series as per Table 1.

When overlapping between clearance hole edge and the under head fillet of the screw is to be avoided, the clearance hole d_2 shall be chamfered. From this, however the bearing stress on the head surface will increase.

Example for applicable screws for the given Series in Table 1.

Series 1 — For screws as per IS 1366/ISO 1207, IS 2269/ISO 4762 without washers.

Series 2 — For screws as per IS 6101/ISO 1580, IS 7483/ISO 7045 without washers.

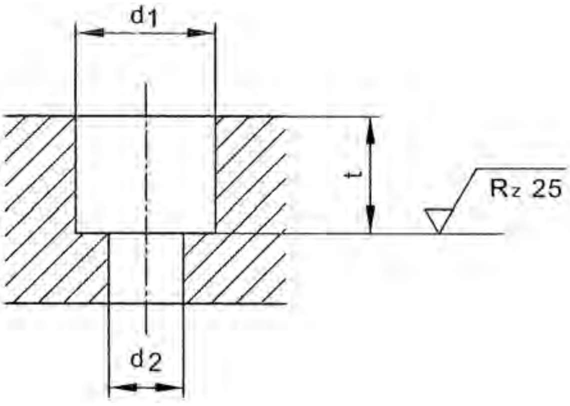
Series 3 — For screws with washers as per IS 6735.

Series 4 — For screws with cylindrical head with suitable washers as per international practice.

Series 5 — For screws with cylindrical head with following washers as per international practice.

4 DETERMINATION OF COUNTERBORE

A counterbore is specified by the counterbore diameter d_1 and the counterbore depth t (*see* Fig. 1).



d_1 = counterbore diameter
d_2 = clearance hole diameter
t = counterbore depth

FIG. 1 COUNTERBORE

This standard does not specify the depth of counterbore, as the depth of counterbore is to be

Table 1 Counterbore Diameters d_1

(*Clause* 3)

All dimensions in millimetres.

Thread Nominal Diameter *d*	**Clearance Hole Diameter** d_2 **(Medium Series as per IS 1821)**	**Screws Without Washers**	**Screws with Washers** [1]			
		Counterbore Diameter d_1 [2] H13				
		Series 1	Series 2	Series 3	Series 4	Series 5
1	1.2	2.2	—	—	—	—
1.2	1.4	2.5	—	—	—	—
1.4	1.6	3	—	—	—	—
1.6	1.8	3.5	3.5	—	—	—
1.8	2.1	3.8	—	—	—	—
2	2.4	4.4	5	—	5.5	6
2.5	2.9	5.5	6	—	6	7
3	3.4	6.5	7	6.5	7	9
3.5	3.9	6.5	8	6.5	8	9
4	4.5	8	9	8	9	10
5	5.5	10	11	10	11	13
6	6.6	11	13	11	13	15
8	9	15	18	15	16	18
10	11	18	24	18	20	24
12	13.5	20	—	20	24	26
14	15.5	24	—	24	26	30
16	17.5	26	—	26	30	33
18	20	30	—	30	33	36
20	22	33	—	33	36	40
22	24	36	—	36	40	43
24	26	40	—	40	43	48
27	30	46	—	46	46	54
30	33	50	—	50	54	61
33	36	54	—	54	—	63
36	39	58	—	58	63	69
42	45	69	—	69	73	82
48	52	78	—	78	82	98
56	62	93	—	93	93	112
64	70	107	—	107	107	125
72	78	118	—	118	118	132
80	86	132	—	132	132	150
90	96	145	—	145	145	170
100	107	160	—	160	160	182

[1] For joints with more washers the series for the washer with larger diameter applies.

[2] The counterbore diameters are valid only when the corresponding screws and washers are valid in the dimensional standards.

selected according to the application. However, it is recommended that the depth of counterbore shall be determined as follows:

The counterbore depth '*t*' (for mounting the screws below the surface) is the sum of the maximum value of the head height of the screw plus the height of the washers plus additional value as per Table 2.

Example:

Calculation of counterbore depth for a cylindrical screw ISO 4762-M12 × 60-10.9 with washer ISO 7092-12-300 HV

Maximum head height, k_{Max} = 12 mm
Maximum washer thickness, h_{Max} = 2.2 mm
Addition = 0.6 mm
$t = k_{Max} + h_{Max} +$ Addition = 14. 8 mm

the result can be suitably rounded

Table 2 Additional Value for Calculation of Counterbore Depth '*t*'

Thread Nominal Diameter *d*	**Additional Value**
$1 < d \le 1.4$	0.2
$1.4 < d \le 6$	0.4
$6 < d \le 20$	0.6
$20 < d \le 27$	0.8
$27 < d \le 100$	1.0

5 GENERAL TOLERANCES

For dimensions (except d_1) : Form and position tolerances as per general tolerances given in the drawing are valid as per IS 2102 (Part 1)/ISO 2768-1 and IS 2102 (Part 2)/ISO 2768-2.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160022	260 3843 260 9285
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